REMARKS

In view of the forgoing amendments and the following remarks, Applicants respectfully request reexamination of the present application. Claims 81 to 85 have been amended to correct the dependency of the claims. No new matter has been added.

The present invention is directed to the fabrication and analysis of material systems that include at least first and second material components. The method enables the rapid fabrication and analysis of a large number of different material systems to identify the material system with the desired properties.

The Examiner has rejected Claims 1-85 under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,985,356 to Schultz et al. in combination with U.S. Patent No. 5,534,066 to O'Neill et al. Applicants respectfully traverse this rejection.

Relevant Legal Doctrines

To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). In addition, there must be a teaching or suggestion to make the claimed combination and a reasonable expectation of success that are found in the prior art, and not in the applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). In determining the propriety of the Patent Office case for obviousness in the first instance, it is necessary to ascertain whether or not the reference teachings would appear to be sufficient for one of ordinary skill in the relevant art having the reference before him to make the proposed substitution, combination, or other modification. *In re Linter*, 458 F.2d 1013, 1016, 173 USPQ 560, 562 (CCPA 1972).

There are three possible sources for a motivation to combine references: the nature of the problem to be solved, the teachings of the prior art, and the knowledge of persons of ordinary skill in the art. *In re Rouffet*, 149 F.3d 1350, 1357, 47 USPQ2d 1453, 1457-58 (Fed.Cir. 1998) and MPEP 2143.01. When the motivation to combine the teachings of the references is not immediately apparent, it is the duty of the examiner to explain why the

combination of the teachings is proper. *Ex parte Skinner*, 2 USPQ2d 1788 (Bd. Pat. App. & Inter. 1986).

U.S. Patent No. 5,985,356 by Schultz et al.

Schultz et al. is directed to a method and apparatus for the preparation and use of a substrate having an array of diverse materials in predefined regions on the substrate. The substrate is prepared by delivering components (i.e., reactants) of materials to predefined regions on the substrate and simultaneously reacting the components to form at least two materials. See, e.g., the Abstract. An array of materials having different chemical compositions is formed by delivering the different reactants to pre-defined regions on the substrate in a step-wise fashion. Multiple deposition steps and masking techniques are used to vary the concentration of a particular reactant that is deposited on a given region of the substrate. A small, precisely metered amount of each reactant component is delivered into each reaction region. (Col. 10, lines 37-39 and Col. 15, lines 8-17). By varying the amount of the individual reactants deposited from one region to another region, different materials can be formed on the substrate.

The Examiner states that Schultz et al. fails to specifically teach a "real-time" monitoring of the system for changes in the composition of the reacted materials.

U.S. Patent No. 5,534,066 by O'Neill et al.

The Examiner states that O'Neill et al. teaches a fluid delivery apparatus having an infrared feedline sensor for monitoring the concentration of a component of the feed gas, the sensing and monitoring being done continuously in real-time.

More specifically, O'Neill et al. disclose a chemical vapor deposition (CVD) apparatus. Referring to Fig. 1 of O'Neill et al., the apparatus includes a reservoir **30** containing a reactant **32**. A conduit **34** delivers the reactant in a carrier gas **38a** to the reaction chamber **22**. Diluent gases **38b** and **38c** are combined with the reactant and carrier gas before passing through an IR sensor **40**. The IR sensor, coupled to a computer (see, e.g., Fig. 7) can be used to control the mass flow of the carrier gas and diluent gases via mass flow controllers, thereby controlling the deposition rate of the reactant in the CVD

chamber. (See, e.g., Fig. 8 and Col. 5, line 42 to Col. 6 line 9). Alternatively, the computer calculates the flow of input gas from the concentration measured by the detector, integrates the results versus time and adjusts the time of the deposition or other process parameters (e.g., deposition or etch rate). See Col. 5, lines. 46-53. The CVD reactor is preferably a plasma reactor. (Col. 2, lines 54 to 57).

Examiner's Conclusion as to Obviousness

The Examiner states that Schultz et al. fails to specifically teach a "real-time" monitoring of the system for changes in the composition of the reacted materials. However, the Examiner concludes that it would have been obvious at the time the invention was made to modify Schultz et al. to incorporate real-time monitoring as evidenced by O'Neill et al. with the expectation of achieving a more consistent final product as a result of tighter control of the process to avoid downtime or unacceptable results. With respect to Claims 6-9, 19-22, 27, 28 and 35, the Examiner states that Schultz et al. is silent with regards to the various claimed deposition techniques. However, it is the Examiner's position that one skilled in the art at the time the invention was made would have had a reasonable expectation of achieving similar results regardless of the deposition technique utilized. Furthermore, the prior art disclose numerous techniques which suggest to one skilled in the art that the deposition technique is not critical to produce desired results.

Claims 1 to 12

Independent Claim 1 requires that a *material property* of at least one of the first material system component and the second material system component *be varied* on a real-time basis. The Examiner admits that Schultz et al. fail to disclose "real time *monitoring of the system for changes in the composition* of the reacted materials". While that is true, it misses the crux of Claims 1 to 12. That is, Claims 1 to 12 require that a property of at least one of the material system components *be varied* on a real time basis to change the deposited material composition. This is a proactive step, as apposed to just

passively monitoring the composition Schultz et al. do not disclose or suggest this aspect of the invention either.

Further, it is submitted that the Examiner has not provided any basis for combining the teachings of Schultz et al. and O'Neill et al. *Ex parte Skinner* Schultz et al. is directed to the combinatorial synthesis of materials in small reaction regions, whereas O'Neill et al. is directed to quality control (i.e., control of film thickness) during a CVD manufacturing process. When examining the nature of the problem to be solved by the present invention, the rapid combinatorial synthesis of different material systems for analysis and selection of a desired material system, one skilled in the art would not be motivated to look to prior art directed to a CVD production process for controlling the thickness of a deposited film. Indeed, *O'Neill et al. is directed to a method for ensuring that the* ***same*** *film thickness* is deposited onto the substrate, not to intentionally vary a material property of the film.

Further, the teachings of the cited references would not lead one of ordinary skill in the art to the claimed invention. As noted above, Schultz et al. does not disclose or suggest the variation of a material property of a component on a real time basis. O'Neill et al. also does not disclose or suggest the variation of a material property of a system component on a real-time basis. O'Neill et al. merely disclose the variation of carrier gas and diluent gas flow rates into a CVD reactor for deposition of the vapor onto the substrate. The carrier gas and diluent gas are *not* material system components that are deposited on a substrate. The reactant composition is not varied by O'Neill et al., nor is any property of the reactant.

Dependent Claims 2 and 3 recite that at least one of the components is a particulate reacted precursor. O'Neill et al. is directed to a CVD process and is not even amenable to particulates. Claim 7 recites that the feature is a linear feature. While the Examiner's position is noted, neither Schultz et al. or O'Neill et al. are even amenable to the deposition of linear features.

In view of the foregoing, Applicants request removal of this rejection with respect to Claims 1 to 12.

Claims 13 to 25

Independent Claim 13 recites that the relative concentration of at least one of the first material system component and the second material system component be varied on a real-time basis. As is discussed above, Schultz et al. does not disclose such a process step. Further, O'Neill et al. merely disclose the variation of the flow rate of a carrier gas and/or diluent gas into a CVD chamber, not the relative concentrations of material system components. There is no change in the deposited material composition according to O'Neill et al. and, in fact, O'Neill et al. is attempting to maintain the *same* film thickness throughout the deposition process.

Therefore, removal of this rejection with respect to Claims 13 to 25 is requested.

Claims 26 to 32

Independent Claim 26 is directed to the fabrication of a multi-layer structure wherein the composition of at least one layer is varied on a real-time basis. As is discussed above with respect to Claims 1 to 12, the prior art, alone or in any combination, does not disclose or suggest the variation of a material composition on a real time basis. Further, neither of the cited references discloses or suggest forming a multi-layer structure.

Therefore, removal of this rejection with respect to Claims 26-32 is requested.

Claims 33 to 39

Independent Claim 33 recites that the ratio of the first material to the second material is varied on a real-time basis during the formation of a multi-layer structure. As stated above, neither Schultz et al. or O'Neill et al. disclose or suggest varying the ratio of two materials forming a multi-layer structure on a real-time basis.

As is discussed above, neither of the cited references discloses a multi-layer structure, particularly with a ratio of the first material to the second material is varied on real-time basis.

Therefore, removal of this rejection with respect to Claims 33-39 is requested

Claims 40 to 46

Independent Claim 40 recites that at least one of the material system components is a particulate reacted precursor. As is discussed above, Schultz et al. does not disclose or suggest a particulate reacted precursor. O'Neill et al. is directed to a CVD process and is not even amenable to the deposition of particulate materials.

Therefore, removal of this rejection with respect to Claims 40 to 46 is requested.

Claims 47 to 51

Independent Claim 47 recites that the material system is an ultra-low fire conductor composition and at least one of the components is a metal-organic decomposition compound. In addition to the foregoing, such material systems are neither disclosed nor suggested by Schultz et al. or O'Neill et al.

Therefore, removal of this rejection with respect to Claims 40 to 46 is requested.

Claims 52 to 56

Independent Claim 52 recites that the components include an electrocatalyst and a polymer. Such a combination is neither disclosed for suggested by Schultz et al. or O'Neill et al. Further, the CVD process of O'Neill et al. would not even be capable of depositing such a composition.

Therefore, removal of this rejection with respect to Claims 52 to 56 is requested.

Claims 57 to 63

Independent Claim 57 recites that the components include carbon and a polymer. As is discussed above, O'Neill et al. would not even be capable of depositing such a composition.

Therefore, removal of this rejection with respect to Claims 57 to 63 is requested.

Claims 64 to 69

Independent Claim 64 recites a process wherein at least one of the components is a particulate component and the relative concentration of at least one of the components is varied on a real-time basis. As is discussed above, neither reference discloses or suggests varying the relative concentration on a real-time basis. Further, the CVD process of O'Neill et al. is not amenable to the deposition of particulate materials.

Therefore, removal of this rejection with respect to Claims 64 to 69 is requested.

Claims 70 to 74

Independent Claim 70 recites that the composition is an ultra-low fire composition including at least a metal-organic decomposition compound and that at least the relative concentration of the components is varied on a real-time basis. As is discussed above, neither of these aspects are disclosed or suggested by the prior art of record.

Therefore, removal of this rejection with respect to Claims 70 to 74 is requested.

Claims 75 to 79

Independent Claim 75 recites that the composition includes at least an electrocatalyst and a polymer and that at least the relative concentration of the components is varied on a real-time basis. As is discussed above, neither of these aspects of the present invention is disclosed or suggested by the prior art of record.

Therefore, removal of this rejection with respect to Claims 75 to 79 is requested.

Claims 80 to 85

Independent Claim 80 recites that the components include at least carbon particles and a polymer and that the relative concentration of the components is varied on a real-time basis. As is discussed above, neither of these aspects of the present invention is disclosed or suggested by the prior art of record.

Therefore, removal of this rejection with respect to Claims 80 to 85 is requested.

Provisional Double Patenting Rejection

The Examiner has further provisionally rejected Claims 1-85 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claims 1-5, 13-15, 18-21, 24-27, 31, 40-43, 64-67, 75-77, 80-83, 86-89, 93-95, 103-105, 108-111 and 114-117 of commonly-owned U.S. Patent Application Serial No. 09/821,723.

The rejection under double patenting is acknowledged, and will be addressed when claims in U.S. Patent Application Serial No. 09/821,723 or the present application are otherwise in condition for allowance.

Applicants believe that all pending claims are in condition for allowance and such disposition is respectfully requested. In the event that a telephone conversation would further prosecute and or expedite allowance, the Examiner is invited to contact the undersigned.

Respectfully submitted,

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